Docket No. PRG 0001 PA

BOWLING TARGET GUIDE KIT AND METHODS THEREOF

BACKGROUND OF THE INVENTION

The present invention relates in general to devices and methods for improving bowling scores, and in particular to tools including target guides and methods of using the target guides for lining up shots in a game of bowling.

In a conventional bowling game, a bowler throws a bowling ball down a wooden or synthetic lane in an attempt to knock over bowling pins arranged at the opposite end of the lane. In a typical game, such as ten pin bowling, a bowler throws a first ball at 10 pins arranged in a triangular pattern. If all 10 pins are knocked down on the first attempt, a "strike" is declared and the bowler's turn is completed. If, on the other hand, one or more pins remain standing after the bowler throws the first ball, the bowler gets a second chance to knock down the remaining pins. If, on the second try, a bowler knocks down all of the pins that remain standing, a "spare" is declared.

The number of pins knocked down including the number of strikes and spares obtained by a bowler, and the order in which the strikes and spares are obtained, affect the bowler's overall score. Moreover, the amount of points derived when a bowler scores a strike or spare is determined, at least in part, by the scores obtained on subsequent shots. As such, a skilled bowler can outscore a non-skilled bowler quite quickly.

Beginners to the game of bowling often start out using a bowling technique whereby a bowling ball is launched generally straight down a bowling lane. Bowling straight shots is conceptually easy grasp and can result in moderate degrees of success, particularly when bowling at the top of a frame. However, this approach has shortcomings, especially when a bowler attempts to make certain spare combinations. More advanced bowlers use a technique whereby a rotation, or spin is put on the ball. Using this technique, a bowler can direct the bowling ball to curve into the pins at an

angle relative to the longitudinal axis of the bowling lane. This approach allows bowlers to target specific pockets between pins, and provides a greater degree of flexibility to the bowler when trying to pick up difficult spare combinations.

Proper positioning of the ball as the ball approaches the pins depends on a number of factors, including for example, the initial lateral positioning of the ball when launched down the lane, the angle with respect to the longitudinal axis of the bowling lane that the bowling ball is thrown, the action (the spin or rotation placed upon the ball as it is released by a bowler), the amount of oil and the position of the oil on the lane, the aridness of the bowling alley on a particular day, and generally, the physical composition and condition of the lanes themselves. Because of the myriad of factors that affect how a lane reacts on a given day, it is neither trivial nor intuitive to grasp a technique that will yield consistent results, even after a bowler develops the technique for applying spin to the bowling ball.

Accordingly, there is a need for systems and tools including target guides, and methods thereof that provide instructions to bowlers of a wide variety of skill levels that assist a bowler in aligning their shots.

SUMMARY OF THE INVENTION

The present invention overcomes the disadvantages of previously known techniques for bowling by providing tools including target guides and methods of using the target guides that provide guidance as to how to align shots in a game of bowling. Moreover, the tools and techniques of the present invention can be arranged in a kit form whereby certain components described more fully herein are packaged together.

According to an embodiment of the present invention, a target guide is provided that assists in helping a bowler accurately line up a shot. Essentially, the target guide shows a bowler where to release the ball and what to target in their shot to achieve a desired breakpoint as defined herein. The target guide may further optionally instruct a

bowler where to position oneself in order to obtain a desired release point when bowling a shot.

According to another embodiment of the present invention, a kit of components is provided that includes a target guide to assist a bowler in aligning a shot, and accompanying instructions materials. The instruction materials may include for example, printed materials, video recorded materials, computer-based materials such as instructions, including any combination of written, visual and audible, on compact disk or other computer readable medium. The instructions may include for example, methods of determining the drift of a bowler taking a shot and the arm swing of a bowler taking a shot.

According to an embodiment of the present invention, a target guide is provided that includes pre-computed target points that allow a bowler to align a shot towards any target, angle and desired breakpoint.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The following detailed description of the preferred embodiments of the present invention can be best understood when read in conjunction with the following drawings, where like structure is indicated with like reference numerals, and in which:

Fig. 1 is a block diagram of the bowling target guide system according to an embodiment of the present invention;

Fig. 2 is a fragmentary view of a typical bowling lane with large portions of the lane cut away for clarity;

Fig. 3 is a flow chart illustrating a setup aspect according to an embodiment of the present invention;

Fig. 4 is a flow chart illustrating a procedure for determining the drift of a bowler according to an embodiment of the present invention;

Fig. 5 is a fragmentary partial view of the approach section of a typical bowling lane illustrating various positions of a sliding foot of a bowler used for determining drift according to an embodiment of the present invention;

Fig. 6 is a flow chart illustrating a procedure for determining the release point of a bowler according to an embodiment of the present invention;

Fig. 7 is a fragmentary partial view of the approach section of a typical bowling lane illustrating various positions of a sliding foot of a bowler used for determining the release point according to an embodiment of the present invention;

Fig. 8 is a top view of a typical bowling lane illustrating an exemplary target point and an exemplary break point according to an embodiment of the present invention;

Fig. 9A is an exemplary layout for a bowling shot target guide according to an embodiment of the present invention;

Fig. 9B is a top view of an exemplary layout for a bowling shot target guide, which may be useful for spare shots;

Fig. 10 is a schematic illustration of a kit of components for a assisting a bowler in aligning bowling shots according to an embodiment of the present invention; and

Fig. 11 is a top view of an exemplary worksheet that may be used with various methods herein, or in combination with a kit of materials such as the kit schematically illustrated in Fig. 10.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration, and not by way of limitation, specific preferred embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and that changes may be made without departing from the spirit and scope of the present invention.

Referring to Fig. 1, a system 10 is provided to assist a bowler in precisely lining up a shot. When used properly, the system 10 defines a bowling target guide that is

based upon precise calculations and enables a bowler to line up and hit any target, angle, and desired breakpoint. It should be clearly pointed out that the effectiveness and results of the present invention may vary from bowler to bowler depending for example, upon how consistent a particular bowler is. The present invention is not a substitute for practice and the bowler should continue to strive for consistency when practicing the present invention.

The system 10 comprises a setup aspect 12, which is implemented to identify certain characteristic traits, including the approach and swing that are unique to that particular bowler. Once the setup aspect 12 is complete, a bowler uses the targeting guide 14 to identify how to line up a shot.

A typical bowling lane includes a generally elongate, rectangular playing surface that has a longitudinal dimension in excess of 75 feet (22.8 meters) and a lateral dimension just under 4 feet (1.2 meters). Referring to Fig. 2, only those sections of a bowling lane 20 that are necessary to facilitate the discussion herein are shown. Note that the dimensions of the lane 20 are grossly exaggerated to clarify the description below. The lane 20 is approximately 40-42 inches (101.6 to 106.68 centimeters) wide and comprises 39 wooden or synthetic planks 22, each plank 22 dimensioned slightly over one inch (2.54) centimeters wide. Gutters 24, 26 typically flank either side of the lane 20. For purposes of this discussion, the lane 20 is generally delineated into three basic sections. A first section 28, which is also referred to herein as the approach section 28, defines an area where the bowler shoots the ball. A foul line 30 divides the approach section 28 from a second section 32, which is also referred to herein as the lane section 32. At the end of the lane 20 opposite the approach section 28 is a third section 34, which is also referred to herein as a pin section 34. The pin section 34 defines that portion of the lane 20 where bowling pins 36 are set up. The basic idea of bowling is for a bowler to launch a bowling ball from the approach section 28 such that the bowling ball travels down the lane section 32 to the pin section 34 in an attempt to knock over as many bowling pins 36 as possible.

The length of the approach section 28 may vary slightly across different bowling alleys. However, the approach section 28 is typically in excess of 15 feet (4.5 meters) in length. The approach section 28 includes a first set of approach dots 38 positioned typically 12 feet (3.6 meters) from the foul line 30. As shown, the first set of approach dots 38 comprises seven dots, although some lanes may have only five dots. A dot is placed on the fifth, tenth, and fifteenth board from both edges, and a center dot, which is larger than the others of the first set of approach dots 38, is positioned on the twentieth (center) board. A second set of approach dots 40 are positioned 15 feet (4.6 meters) from the foul line 28. As with the first set of approach dots 38, the second set of approach dots 40 includes seven dots, one dot on the fifth, tenth and fifteenth boards from both edges, and one dot on the twentieth board (center) board. Again, some lanes may have only 5 dots. A third set of approach dots 41 are provided just inside the foul line 30, again, one dot on the fifth, tenth and fifteenth boards from both edges, and one dot on the twentieth board (center) board.

The lane section 32 may optionally include a third set of dots 42 proximate to the foul line 30. The third set of dots 42 are typically located on the third, fifth, eighth, eleventh and fourteenth board as counted from both edges. Additionally, a set of arrows 44 are positioned 15 feet (4.6 meters) from the foul line 30. An arrow appears on every fifth board. Moreover, the arrows 44 are frequently staggered into an arrowhead shape so that a bowler can discriminate between adjacent arrows more easily. The lane section 32 is 60 feet (18.3 meters) long as measured from the foul line 30 to a head pin 46 of the bowling pins 36 in the pin section 34. The pin section 34 is where the bowling pins 36 are arranged. At the top of each frame, the bowling pins 36 are typically arranged in a triangular pattern consisting of 10 bowling pins 36.

All lanes play differently so a bowler must adjust to the lane characteristics. The conditions of the lane section can vary widely, even on the same lane from day to day. This phenomenon is due to a number of factors. For example, the lane section

includes patterns of oil on the lane surface. The amount of oil, and the pattern of the oil on the lane surface will affect how the ball reacts as the ball rolls down the lane. Also, environmental conditions such as temperature and humidity affect lane conditions.

Referring back to Fig. 1, to optimize the success of the certain embodiments of the invention herein, the setup aspect 12 should be properly completed. Referring to Fig. 3, a setup 50 is flowcharted according to an embodiment of the present invention.

The first aspect of the setup 50 is a warm up at 52. While certainly not required, it has been found that taking a few practice warm up shots before performing any of the other steps herein may improve the results obtained using the present invention. The warm up shots will typically assist the bowler in becoming loose so that the steps followed herein are more consistent with their typical bowling technique. It should be pointed out that the consistency of the bowler can have an effect upon the success of the setup process. It has been found that bowlers can be inconsistent not only during the course of bowling a game, but also from day to day. As such, a bowler may opt to periodically repeat the setup 50 to verify that the determined parameters for the techniques described herein are still accurate.

After a suitable warm up 50, the drift of the bowler is determined at 54. The drift is a basic measure of how far a bowler shifts laterally across the lane when delivering a bowling ball. The next step of the set up 50 is to determine the arm swing release distance at 56. The arm swing release distance defines a lateral offset measured across a width of the bowling lane from a sliding foot of the bowler to a point at which the bowling ball is released from a hand of the bowler.

Referring to Fig. 4, a method 60 is provided for determining the drift of a bowler according to an embodiment of the present invention. To determine whether a bowler has drift, and to measure the amount of drift, the bowler selects a starting point and lines up thereat at 62. The starting point can be virtually anywhere on the lane, but is

preferably somewhere in the approach area of a lane. The bowler then bowls a ball down the lane using their typical approach at 64. At the end of the approach, after the bowler has released the ball, a finishing point is acknowledged at 66. Once the finishing point has been acknowledged, the drift of the bowler is easily determined from the lateral distance across the lane that the bowler shifted from the starting point to the finishing point at 68. The method 60 may be repeated as necessary to ensure that the correct drift of the bowler is determined.

Fig. 5 illustrates one exemplary approach to implementing the method 60 discussed with reference to Fig. 4. Referring to Fig. 5, to determine an amount of drift, the bowler places their sliding foot 80 next to a predetermined one of the boards 22 in the lane 20. The predetermined position is illustrated in Fig. 5 is generally designated as a starting point (SP). While any board may be used, indeed, any position within the lane 20 may be used, selecting a board at or near the twentieth board is a convenient reference point because it is the center board, and is generally easily identified by the relatively larger circular marker in both the first and second sets of approach dots.

The sliding foot 80 of a bowler is the foot opposite the hand in which the bowler delivers the ball when bowling. For example, a typical right-handed bowler will bowl the bowling ball with their right hand. Under such circumstances, the left foot is usually the sliding foot 80. Alternatively, a bowler who delivers the ball with their left hand will typically use their right foot as their sliding foot. A right foot as the sliding foot is designated in Fig. 5 as the phantom footprint 82 adjacent to the starting point SP. One convenient starting point SP is the 20^{th} board. To define a starting point of the 20^{th} board, the right handed bowler would place their sliding foot (left foot) so as to be positioned next to the 19^{th} board counting from the right. A left handed bowler would correspondingly place the sliding foot (right foot) next to the 19^{th} board counting from the left.

As one illustrative example, the right-handed bowler places their sliding foot 80 (left foot in this instance) such that the twentieth board is just to the right of the sliding foot. That is, the bowler is actually standing with the left foot on the twenty first board counting from the right, thus the starting point SP is 21 (from the right). A left-handed bowler would stand such that the twentieth board is just to the left of the sliding foot 82 (right foot in this instance). That is, the bowler is standing with the right foot on the twenty first board counting from the left thus the starting point is 21 (from the left). After suitably positioning oneself, the bowler executes a shot using their typical approach. After releasing the bowling ball, the position of the sliding foot 80 or 82 is acknowledged. The final position of the bowler is designated herein as the finishing point (FP).

In one exemplary approach shown in Fig. 5, the right-handed bowler (left sliding foot 80) has a left drift of 6 boards. The left- handed bowler illustrated in phantom lines as sliding foot 82, has a right drift of three boards in this illustrative example. Of course, the drift, whether right or left will vary from bowler to bowler. Moreover, not all right-handed bowlers will drift left as illustrated. The bowler may drift right, left, or exhibit no drift at all, irrespective of whether the bowler uses their right or left hand to deliver the bowling ball. Moreover, the finishing point may not necessarily end perfectly at the edge of a board. Under such circumstances, the drift can be further represented in partial board widths, using for example, either fractional or decimal designations. For example, a split board, referred to herein as (SB) can be used to abbreviate a half board width, that is, a position between two adjacent boards.

Regardless of direction of the drift, if any, the drift is expressed as a relative displacement from the starting point. For example, the left sliding foot 80 (right-handed bowler) started at board 20, but ended up at board 26 counting the boards from right to left, and thus has a drift of 6 boards left. Similarly, the right sliding foot 82 (left-handed bowler started at board 20, but ended up at board 17 counting right to left, and thus has a drift of 3 boards right. Moreover, while the general terms left drift and right drift are

used herein, these terms are used merely for convenience sake and serve as a readily recognized indication of the lateral change and direction of the finishing point with respect to the starting point.

As a pure matter of convenience, drift to the left is assigned a positive polarity, and drift to the right is assigned a negative polarity for right-handed bowlers. The opposite polarities are assigned for left-handed bowlers as summarized in table 1 below.

BOWLER	DRIFT LEFT	DRIFT RIGHT
Right-Handed	(-) designation	(+) designation
Left-Handed	(+) designation	(-) designation

Table 1: Drift polarity

Under certain circumstances, the determination of drift may be repeated a number of times. The number of repeated measurements will depend upon a number of factors including for example, the consistency of the bowler. The drift may comprise for example, an average based upon a number of trials, or the bowler may settle into a consistently repeatable drift, in which case, the drift will be the measurement settled into after a number of repetitions. Of course, any number of other statistical measures may be used to determine drift where repeated trials are performed.

Referring back to Fig. 3, in addition to determining the drift at 54, the arm swing release distance of the bowler must be determined at 56. For sake of simplicity herein, the arm swing release distance will be designated as a relative measure of the lateral distance from the finish point of the bowler to approximately the position of the hand of the bowler as the bowling ball is released. As a general rule of thumb, the arm swing release distance for a typical right-handed bowler has been found to be approximately five to six board lengths to the right of the finishing point of the sliding foot of the bowler. Similarly, the release point of a typical left-handed bowler has been found to be

approximately five to six boards to the left of the finishing point of the sliding foot of the bowler.

Referring to Fig. 6, a method 90 is provided for determining the arm swing release distance of a bowler. Basically, a release point is selected at 92. The release point is the lateral position that a bowler wishes to deliver the bowling ball. Next, an initial arm swing release distance is assumed at 94. The assumed arm swing release distance is factored in to the release point at 96 and the previously determined drift of the bowler is factored into the release point at step 98. After the arm swing release distance and drift of the bowler have been factored into the determination of the release point, the starting point of the bowler to achieve the delivery of the bowling ball to the release point is realized. Starting at the computed starting point, the bowler bowls the ball down the lane at 100. If the arm swing release distance of the bowler is indeed the initial, assumed arm swing release distance, the ball should travel generally down the designated release point. Any variance to the right or left of the release point is due to an incorrect assumption in the arm swing release distance of the bowler, and the arm swing release distance is appropriately corrected at 102.

Referring to Fig. 7, an example of one approach is provided for implementing the method 90 described with reference to Fig. 6. Again, a release point (designated RP) is established. Any arbitrary position on the lane 20 can be used. However, for the sake of discussion herein, the release point for a right-handed bowler will arbitrarily chosen to lie along the tenth board as counted from the right hand side of the lane 20. In a parallel manner, the release point for a left-handed bowler is arbitrarily chosen to be the tenth board when counting from the left hand side of the lane 20.

The selection of the tenth board from the respective end of the lane 20 is generally arbitrary, and is chosen as a matter of convenience and familiarity to many bowlers. However, to determine whether a shot is aligned with the release point, it is convenient to have a readily identifiable way to determine precisely where (laterally) the

ball is released. While any position along the lane may be used in the determination of the release point, it is convenient to use the arrows 44 in the lane portion as a measure of the release point of the bowler. In the example shown, the tenth board from the end will be used, and the bowler will thus target the second arrow in the lane section 22. Any other arrow or other position within the lane may alternatively be used of course. The second arrow from either end is the most common target at the arrows used to generate some angle of the ball as it hits the pins. Moreover, the tenth board usually allows plenty of room to accommodate for typical drift.

As illustrated, a right-handed bowler will target the tenth board, and corresponding second arrow as counted from the right hand side of the lane. A left-handed bowler, illustrated in phantom lines, will target the tenth board as counted from the left, and corresponding second arrow from the left of the lane section. To hit the desired release point, the bowler needs to know where to start their approach. Because we assume that the typical arm swing release distance varies laterally about five boards from the release point of a bowler, this will become our default starting arm swing release distance. A bowler can also preferably compensate for their previously determined drift to derive at a suitable starting position.

For example, assume that a bowler has selected a release point straight down the tenth board. Further, assume that the bowler has no drift and a release point of five boards. Under such circumstances, the right-handed bowler would line up such that the fifteenth board as counted from the right hand side of the lane is just to the right of the sliding foot of the bowler. Correspondingly, a left-handed bowler with no drift would start at the fifteenth board as counted from the left to bowl straight down the tenth board (second arrow) as counted from the left.

However, where a bowler has drift, the drift must be accounted for. The compensation for drift can be expressed generally, as:

$$SP = RP + ASPD + DRIFT \quad (1)$$

where SP designates the starting point of the bowler, RP is the release point where the bowling ball is intended to be released, ASRD is the arm swing release distance of the ball relative to the finishing point of the bowler, and DRIFT is the relative direction and distance of drift of the bowler from the starting point to the finishing point of the bowler's approach when taking a shot. For convenience sake, each of the above variables will be expressed as a count of the number of boards from a select end of the lane. For a right-handed bowler, it is convenient to count boards starting from the right hand edge working left. For left-handed bowlers, it is often convenient to count boards from the left moving towards the right.

To use formula (1) above correctly, the drift must have the appropriate polarity as illustrated in table 1. Of course, formula 1 can be expressed in numerous different formats. So long as the correct starting point is realized, it is immaterial whether drift left is considered positive or negative. The above-suggested polarities are merely chosen out of convenience and provide a commonsensical approach to determining the starting point.

To see how the formula (1) works with table 1 herein, assume a release point of the tenth board. Also, assume that a right-handed bowler has a left drift of 6 boards (DRIFT = 6 boards left or –6), such as the exemplary right-handed bowler described with reference to Fig. 4. Still further, assume that the arm swing release distance for the bowler is five (5) boards. The starting point (SP) for that bowler to bowl a straight line down the tenth board (RP) or second arrow as counted from the right hand side of the lane, is:

SP=10^{th} board (RP)+5 boards (ASRD)+(-6) boards (Left DRIFT) =9^{th} board.

Accordingly, it should be clear that to compensate for drift, the right-handed bowler increases the number of boards from the right hand side of the lane if the bowler has right hand drift, and decreases the number of boards from the right hand side of the lane if the bowler has a left hand drift.

The bowler in the present example, aligns the starting point (SP) by positioning the sliding foot 80 just to the left of the eight board to achieve a starting point of the ninth board and bowls the ball. Recall that we assumed that the bowler has an arm swing release distance of five boards. The bowler may in fact, have an arm swing release distance that is greater or less than five boards. Once the ball is released, the position of the ball relative to the second arrow (tenth board) is observed. If the ball travels straight down the tenth board and second arrow, the bowler does indeed have a release point of five boards. If the ball travels to the right of the tenth board and second arrow, then the bowler has an arm swing release distance greater than five boards. On the other hand, if the ball travels to the left of the tenth board and second arrow, then the bowler has an arm swing release distance less than five boards. The bowler thus adjusts the starting point relative to the difference between the ball and the tenth board. For example, if the ball traveled down the ninth board, then the bowler has an arm swing release distance of six boards. To verify this, the bowler can reposition the sliding foot 80, this time to the left of the ninth board (SP of tenth board) and bowl again.

SP=10^{th} board+6 boards arm swing release distance+(-6 board drift) = 10^{th} board starting position.

This time, given a drift of six boards left and an arm swing release distance of six boards, the bowling ball should travel straight down the tenth board. The above determination of the arm swing release distance can be repeated as necessary to properly determine the release point of the bowler. Moreover, for optimal performance

improvement of the present invention, the bowler should strive for consistency in the drift and release point achieved during each approach when taking shots.

As a second example, the left-handed bowler shown in phantom in Fig. 4 had a drift of three (3) boards right. As such, first assume an arm swing release distance of 5 boards. Again, the starting determination of the release point is arbitrary and could be any value, but assume a release point of the tenth board as counted from the left hand side of the lane. The starting point of the left-handed bowler should thus be:

SP=RP+ASRD+DRIFT=10^{th} board+5 boards+(-3 boards) =12^{th} board.

Recall that the left-handed bowler counts boards from the left, opposite that of the right-handed bowler, who counts boards from the right. The bowler aligns the sliding foot 82 on the starting point, or eleventh board from the left, bowls, and watches to see what board the ball travels down. If the ball travels straight down the tenth board from the left, the bowler has an arm swing release distance of five (5) boards. If the bowling ball traveled to the left of the second arrow from the left, then the bowler has an arm swing release distance greater than 5. On the other hand, if the bowling ball traveled to the right of the second arrow from the left, then the bowler has an arm swing release distance less than five (5) boards. Assume for example, that the bowling ball rolled straight down the eleventh board from the left. Then the left-handed bowler has a release point of four (4) boards.

Now that the Drift and release point of the bowler have been determined, the target guide of the present invention may be used. Referring to Fig. 8, before describing the target guide, some additional definitions will be helpful. To bowl consistently, it is often helpful to use a consistent frame of reference to target shots. As such, the invention herein uses a target position (designated TP) that can be any arbitrary position in the lane area 32. However, according to an embodiment of the present invention, the target point TP is convenient, consistent from lane to lane, and

easy to visually identify. for example, the target point may be defined as a point along a plane that crosses the lane section 32 laterally at the point (tip) of the centermost arrow 44 (on the twentieth board). A reference with respect to the arrows 44 is generally convenient because the distance of the arrows 44 in the lane section 32 from the foul line 30 are generally consistent from bowling alley to bowling alley, thus a familiar reference will be established. This location can of course, be any other point in the lane section 32 however. Moreover, for the sake of a clear disclosure, the target point (TP) is defined along an imaginary line that runs linearly and laterally across the lane. However, the target position need not be a linear imaginary line.

The other necessary location to identify is the break point, denoted (BP). Unlike traditional methods that discuss break point as the longitudinal distance down the lane where the ball begins to break, the invention recognizes that an exact longitudinal measurement to the breakpoint cannot be expressed for all lanes under all conditions. The break point is affected by lane conditions such as humidity, oil conditions and other factors mentioned more fully herein. According to an embodiment of the present invention, the breakpoint is expressed as a lateral position across the lane approximately where the ball will break. With this approach, the longitudinal distance of exactly where the bowling ball breaks is not critical. For sake of convenience, the lateral position for the break point is determined by counting boards in the lane.

Referring to Figs. 9A and 9B, a target guide 120 according to an embodiment of the present invention is illustrated. Briefly, a target guide 120 identifies target points for a plurality of release points and a plurality of break points in combination, which are pre-computed and stored in a table 122. The target guide 120 is embodied as a fixed media such as a card, stock material or other easily transportable substrate having printed thereon, a table. For example, the target guide can be a printed paper substrate that is laminated for protection and durability, where the substrate is approximately the size of a business card. The target guide 120 can, of course, be printed on any sized substrate and the table 122 can be broken across multiple pages

or substrates. The dimensions of the fixed media are not important to the function of the present invention, however, a small media is more readily transportable and discrete.

The target guide 120 provides the table 122 that is used to align shots. The table 122 comprises a first column 124 that defines the release point, expressed in the illustrated example, in the number of boards (from the right for right-handed bowlers, and from the left for left-handed bowlers). For example, for a right-handed bowler, a value of '4' indicates that the bowler should release the ball at the fourth board as counted from the right.

A second column 126 on the table 122 moving towards the right, is the starting point. The starting point is where the bowler needs to stand to deliver the bowling ball at the release point identified in the first column 124 in the corresponding row. The starting point for each row in the table 122 is computed according to the specific drift and arm swing release distance for a particular bowler and can be filled into the table 122 after the appropriate parameters have been determined. The remainder of the table 122 includes a plurality of break point columns 128.

The break point columns 128 represent specific desired break points. As shown, there are 17 columns representing 17 break points, each break point representing a lateral position across a bowling lane identified by a count of boards. For example, a break point of '2' means that the bowler wants the bowling ball to break towards the pocket at the second board from the edge (right edge for right-handed bowlers and left edge for left-handed bowlers).

The data in the table 122 at the intersection of a particular one of the plurality of release points and a particular one of the plurality of break points, defines a target point. The target point is what the bowler will actually aim for, such as a point designated along an imaginary line across the tip of the arrow on the 20th board as

described with reference to Fig. 8 above. It should be pointed out that 17 columns representing the first 17 boards (counted from the right hand edge for right-handed bowlers and counted from the left hand edge for left handed bowlers) is generally sufficient for the bowler to align an appropriate strike ball. The table 122 can be readily continued using for example, the same pattern across all 39 boards to provide alignment for spares etc. as shown in Fig. 9B.

Referring to Fig. 9B, the table 122 discussed with reference to Fig. 9A is continued out for breakpoints 18 through 39. Such breakpoints provide additional targets for different spare combinations that may arise. It should be clear that the tables shown in Figs. 9A and 9B can be provided as a single table, or as multiple tables as the specific application dictates. Moreover, if multiple tables are provided, a select one or more of the tables can be packaged with the kit described with reference to Fig. 10.

The values in the table 122 were determined experimentally based upon the goal of finding the break point that the bowling ball reaches, but generally goes no further. It is generally undesirable to overshoot the break point, especially when the break point is near the edge, such as the first few boards. Through experimentation, it has been found that by setting the target point as an imaginary line across the tip of the arrow on the 20^{th} board, it turns out that the target point falls laterally approximately midway between the release point and the break point. Of course, if the longitudinal distance to the target line is changed, then the values in the table 122 may require a suitable adjustment.

According to one embodiment of the present invention, based upon the above observation of the relationship between the breakpoint, the release point, and the target point, different target locations can be determined empirically using well-known mathematical formulas.

The key to achieving high scores on today's bowling conditions is reaching the correct breakpoint at the proper angle. Once a bowler's release point and drift have been determined, the alignment system according to the various embodiments of the present invention takes over and helps the bowler become more accurate. According to an embodiment of the present invention, the target guide shows a bowler where to stand and what target to look at to achieve the correct break point on the lanes on a given day. Of course, to achieve the optimal results using the table 122, the bowler must strive for consistency in their approach, drift and relative release points. This can only be achieved by a suitable amount of practice. As an example, the break on the bowling ball will vary depending upon lane conditions. As such, the bowler selects a break point and a starting point and bowls a shot. If the shot is either heavy or light in the pocket, the bowler can make adjustments, either to the starting position, or to the selected break point. Once the bowler locks into the strike zone, i.e. finds the combination of break point and starting point for a particular lane on a particular day, consistent shots can be made.

Referring to Fig. 10, the target guide and methods herein can be packaged as a kit 140 of components comprising an instructional tool. The kit 140 may include for example, the table 122 discussed in more detail with reference to Fig. 9, one or more charts 142 for helping the bowler keep track of their drift and arm swing release distance, a video demonstration of the techniques described herein, such as can be provided on VHS cassette, compact disk, laser disk or any other video format. The kit 140 may also optionally include computer implementations. Although shown schematically as a desktop computer and PDA for exemplary platforms, it shall be appreciated that any aspect herein can be arranged on any computer platform.

Moreover, instead of, or in combination with the table 122, a computer implemented approach can compute and output various target, start point and release point combinations. Convenience to the user will of course, dictate the appropriate format for the delivery of such information.

Referring to Fig. 11, an exemplary worksheet 142 is provided to be filled out while a bowler determines their drift and arm swing release distance. The top half of the worksheet is an exemplary format that assists a bowler in determining drift, such as by the methods described herein with reference to Figs. 3 and 4. The bottom portion of the worksheet 142 provides an exemplary format that assists a bowler in determining arm swing release distance, such as by the methods described herein with reference to Figs. 6 and 7.

Having described the invention in detail and by reference to preferred embodiments thereof, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the appended claims.

What is claimed is: